8. The system of claim 1, wherein generating, based at least in part on the sensed plurality of signals, an alternate signal for each one of the plurality of signals comprises:

determining a phase for each of the plurality of signals at the dominant frequency; and

generating an alternate signal corresponding to one of the plurality of signals for each of the plurality of signals, wherein each generated alternate signal has the same phase as the corresponding one of the plurality of signals.

9. The system of claim 1, wherein determining a dominant frequency for the plurality of signals comprises:

processing each of the plurality of signals using a Fourier Transform; generating a composite signal based on the processed plurality of signals; and

determining the frequency with the greatest power in the composite signal.

10. The system of claim 9, wherein generating a composite signal based on the processed plurality of signals comprises:

determining the median value of all of the plurality of signals at each frequency; determining the mean value of all of the plurality of signals at each frequency; or

determining the mode value of all of the plurality of signals at each frequency.

11. The system of claim 10, wherein each alternate signal is a sinusoid.

12. The system of claim 11, wherein the activation time is displayed on a display.

13. The system of claim 12, wherein an activation time is displayed on a static activation map, a dynamic map, or both.

14. The system of claim 13, wherein displaying an activation map further includes displaying one or more phase values of one or more alternate signals.

15. The system of claim 1, wherein determining, based at least in part on each determined fiducial point, an activation time in each corresponding one of the plurality of signals further comprises utilizing a probability function to determine the activation time.

16. A method of mapping electrical activity of a heart, the method comprising:

sensing a plurality of signals with a plurality of electrodes positioned within the heart;

generating, based at least in part on the sensed plurality of signals, an alternate signal for each one of the plurality of signals, wherein each alternate signal corresponds to one of the plurality of signals and generating the alternate signal for each one of the plurality of signals by determining a dominant frequency for the plurality of signals;

determining a fiducial point on each alternate signal; and

determining, based at least in part on each determined fiducial point, an activation time in each corresponding one of the plurality of signals.

17. A method for mapping the electrical activity of the heart during a cardiac cycle, the method comprising:

sensing a plurality of signals with a plurality of electrodes positioned within the heart, wherein the plurality of signals includes a first signal corresponding to a first electrode location;

converting the first signal to an activation signal, wherein converting includes one or more of filtering, rejecting, isolating, setting positive values to zero, smoothing and inverting;

determining a cycle length of the first signal from the activation signal;

estimating a first activation time for the first signal, wherein the first activation time is determined by using an iterative statistical algorithm, and wherein the iterative statistical method utilizes the activation signal and cycle length; and

estimating a second activation time for the first signal, wherein estimating the second activation time utilizes the estimated first activation time and the cycle length.

18. The method of claim 17, wherein estimating a first activation time for the first signal, wherein the first activation time is determined by using an iterative statistical algorithm, and wherein the iterative statistical method utilizes the activation signal and cycle length further comprises:

selecting a first initialization probability distribution for a first beat in the cardiac cycle; generating a first modified probability distribution, wherein generating includes modifying the first initialization probability distribution with a first low-pass filter;

generating a first modified signal by multiplying the first modified probability distribution with the activation signal; and

selecting a first activation time from the first modified signal.

19. The method of claim 18, wherein estimating a second activation time for the first signal, wherein estimating the second activation time utilizes the estimated first activation time and the cycle length further comprises:

time-shifting the first modified signal by the cycle length;

selecting a second initialization probability distribution for the second beat in the cardiac cycle, wherein the second initialization probability distribution corresponds to the first modified signal;

generating a second modified probability distribution, wherein generating includes modifying the second initialization probability distribution with a second low-pass filter;

generating a second modified signal by multiplying the second modified probability distribution with the activation signal; and

selecting a second activation time from the second modified signal.

20. The method of claim 19, further comprising performing a regularization, wherein the regularization includes multiplying the first or the second modified signal by a fixed-window distribution.

* * * * *